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A review of the Old World *Scrobipalpula* (Gelechiidae), with special reference to central and northern Europe

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Summary. The Old World species of the genus *Scrobipalpula* Povolný, 1964 are reviewed, with special reference to central and northern European taxa. Altogether 4 species, namely *S. psilella* (Herrich-Schäffer, 1854), *S. ramosella* (Müller-Rutz, 1934) **sp. rev.**, *S. diffluella* (Frey, 1870) and *S. tussilaginis* (Stainton, 1867) are accepted as valid. Adults and genitalia of both sexes are figured. *S. retusella* (Rebel, 1891) **syn. n.**, **comb. n.** is a new synonym of *S. tussilaginis* (Stainton, 1867). *S. psilella* f. *compositella* Povolný, 1964 is an invalid species-group name, as are the nomina nuda *astericolellum* Hering, 1957, *ptarmicae* Hering, 1957 and *uniflorellum* Hering, 1957. The lectotype designation of *Aristotelia imperatella* Dumont, 1931 by Viette (1951) is rejected and this taxon is transferred from *Scrobipalpula* to *Ephysteris* Meyrick, 1908.

Zusammenfassung. Die altweltlichen Arten der Gattung *Scrobipalpula* Povolný, 1964 werden unter besonderer Berücksichtigung der mittel- und nordeuropäischen Taxa revidiert. Insgesamt 4 Arten, nämlich *S. psilella* (Herrich-Schäffer, 1854), *S. ramosella* (Müller-Rutz, 1934) **sp. rev.**, *S. diffluella* (Frey, 1870) und *S. tussilaginis* (Stainton, 1867) werden als valid anerkannt. Die Imagines sowie die Genitalstrukturen beider Geschlechter dieser Arten werden abgebildet. *S. retusella* (Rebel, 1891) **syn. n.**, **comb. n.** ist ein neues Synonym von *S. tussilaginis* (Stainton, 1867). *S. psilella* f. *compositella* Povolný, 1964 ist, ebenso wie *astericolellum* Hering, 1957, *ptarmicae* Hering, 1957 und *uniflorellum* Hering, 1957 ein invalider Name. Die Lectotypusdesignierung von *Aristotelia imperatella* Dumont, 1931, durch Viette (1951) wird abgelehnt und dieses Taxon wird aus der Gattung *Scrobipalpula* zu *Ephysteris* Meyrick, 1908 überführt.

Résumé. Les espèces du Vieux Monde du genre *Scrobipalpula* Povolný, 1964 sont revues avec une attention particulière à celles d'Europe centrale et du nord. Parmi elles, quatre espèces, soit *S. psilella* (Herrich-Schäffer, 1854), *S. ramosella* (Müller-Rutz, 1934) **sp. rev.**, *S. diffluella* (Frey, 1870) et

S. tussilaginis (Stainton, 1867) sont acceptées comme valides. Les genitalia des adultes et des deux sexes sont figurés. *S. retusella* (Rebel, 1891) **syn. n., comb. n.** est un nouveau synonyme de *S. tussilaginis* (Stainton, 1867). *S. psilella* f. *compositella* Povolný, 1964 est un nom invalide du groupe-espèce, tout comme les nomina nuda *astericolellum* Hering, 1957, *ptarmicae* Hering, 1957 et *uniflorellum* Hering, 1957. La désignation du lectotype de *Aristotelia imperatella* Dumont, 1931 par Viette (1951) est rejetée et ce taxon est transféré du genre *Scrobipalpula* à *Ephysteris* Meyrick, 1908.

K e y w o r d s: Gelechiidae, *Scrobipalpula*, species, nomenclature, identification, Europe.

Introduction

The genus *Scrobipalpula* Povolný, 1964 differs from related genera of Gnorimoschemini in the structure of the genitalia. The most striking character — a possible synapomorphy — is the spatulate gnathos, which is not found in other Palaearctic Gelechiidae. About 40 species of *Scrobipalpula* are known, mostly from the New World (Povolný, 1991). The few Palaearctic taxa were merged into one single species, *S. psilella* (Herrich-Schäffer, 1854), by Povolný (1964) because of similarities in genitalia and wing pattern. Pelham-Clinton (1989) pointed out that *S. tussilaginis* (Stainton, 1867) should be regarded as a distinct species, and field work in Scandinavia (Aarvik *et al.*, 1988) and in the Alps has convinced us that *S. diffluella* (Frey, 1870) also is specifically different from *S. psilella*. Based on a study of museum material of *S. ramosella* (Müller-Rutz, 1934), we are also able to conclude that this taxon should be regarded as a further distinct species.

Numerous specimens of *Scrobipalpula* from central and northern Europe were available for our study, and information on bionomics mainly originates from this area. Most available specific names of Palaearctic *Scrobipalpula* are based on types from this part of Europe, and connecting them with well defined species is a first, necessary step to resolve the taxonomy of this genus in our part of the world.

The few specimens of *Scrobipalpula* from Asia studied by us all belong to *psilella* or closely related, yet unrecognized taxa. However, future field work in the Himalayas or in East Asia may well reveal additional species. No members of *Scrobipalpula* are at present known from the Afrotropical, Australian or Oriental regions, apart from Nepal.

Our method for making genitalia preparations as "unrolled slides"

(Pitkin, 1986; Huemer, 1987) allowed us to make more detailed comparisons between the male genitalia of the taxa involved.

Host plants of *Scrobipalpula* species are Asteraceae. Individual species are to our knowledge restricted to one or a few genera, differing from species to species. The reason behind this "specific oligophagy" is unknown to us.

Povolný (1967b) considered five Nearctic taxa of *Scrobipalpula* as synonyms of *S. psilella*. From his figures of their genitalia it appears to us as though they represent closely allied, but distinct species, as is the case with the central and northern European taxa dealt with in this paper. This is probably also true for the specimens recorded as *S. psilella* from Patagonia (Povolný, 1987).

Dumont (1931) described *Aristotelia imperatella* from a series of moths bred from stems of *Imperata cylindrica* (Poaceae) in the oasis of Tozeur, Tunisia. Povolný (1983) studied the lectotype selected and published by Viette (1951) and found it to belong to *Scrobipalpula*. Referring Palaearctic taxa of this genus to a single species, he synonymized *imperatella* with *psilella*. A colour slide of the lectotype of *imperatella* is kept in The Natural History Museum, London (BMNH), and this shows that it belongs to *S. tussilaginis*. The larva of this species mines in leaves of *Tussilago farfara*, and it is very unlikely that it could also live within grass stems. It would also be surprising for it to occur in an oasis at the border of the Sahara. Dumont gave a detailed description of his *A. imperatella*, which was certainly not based upon specimens of *S. tussilaginis*. However, it fits an *Ephysteris* Meyrick, 1908 well, as does the life history. Therefore, Viette's lectotype designation is rejected (ICZN Art. 74a(v)), and we transfer *A. imperatella* to the genus *Ephysteris*.

The material for this study is deposited in following collections: Zoological Museum, University of Copenhagen, Denmark (ZMUC); Zoological Museum, University of Helsinki, Finland (ZMUH); Zoological Museum, University of Lund, Sweden (MZLU); Naturhistorisches Museum, Vienna (NMV); Eidgenössische Technische Hochschule, Zurich (ETHZ); Zoologisches Museum, Humboldt Universität, Berlin (ZMHB); The Natural History Museum, London (BMNH); Tiroler Landesmuseum Ferdinandeum, Innsbruck (TLFM), Landessammlungen für Naturkunde Karlsruhe (LNK).

Check-list of Palaearctic *Scrobipalpula*

Scrobipalpula Povolný, 1964

psilella (Herrich-Schäffer, 1854)
nocturnella (Staudinger, 1859)
pallidella (Heinemann, 1870)
killiasii (Frey, 1880)
astericolellum (Hering, 1957) (nomen nudum)
asiatica Povolný, 1968
ramosella (Müller-Rutz, 1934) **sp. rev.**
ptarmicae (Hering, 1957) (nomen nudum)
compositella (Povolný, 1964) (unavailable: ICZN Art. 16)
diffluella (Frey, 1870)
cacuminum (Frey, 1870)
diffluella (Heinemann, 1870)
bellidiastri (Klimesch, 1951)
uniflorellum (Hering, 1957) (nomen nudum)
tussilaginis (Stainton, 1867)
tussilaginella (Heinemann, 1870)
retusella (Rebel, 1891) **syn. n., comb. n.**

Identification keys (genitalia characters)

A key to the adults after external characteristics is not effective due to their close similarity; examination of the genitalia is essential.

Key to species, males (genitalia unrolled)

1. Gnathos hook strongly constricted medially (figs. 17, 19, 33–34) ..... *S. ramosella.*
— Gnathos hook weakly constricted medially (figs. 29–32, 35–37) 2

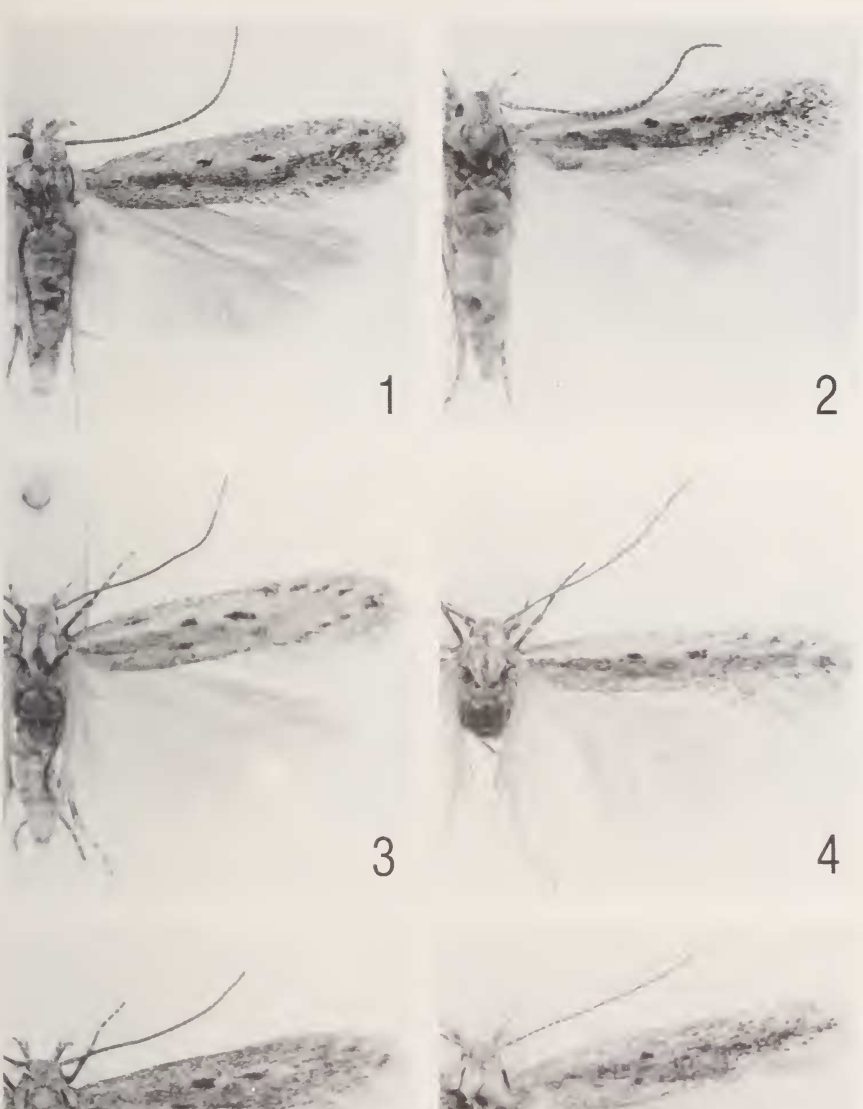
2. Valva pointed, apex exceeding uncus (figs. 13, 15) ..... *S. psilella.*
— Valva rounded, apex at most level with uncus (figs. 21, 23, 25, 27) 3

3. Saccus subrectangular, valva strongly dilated distally (figs. 21, 23) ..... *S. diffluella.*
— Saccus subtriangular, valva moderately dilated distally (figs. 25, 27) ..... *S. tussilaginis.*

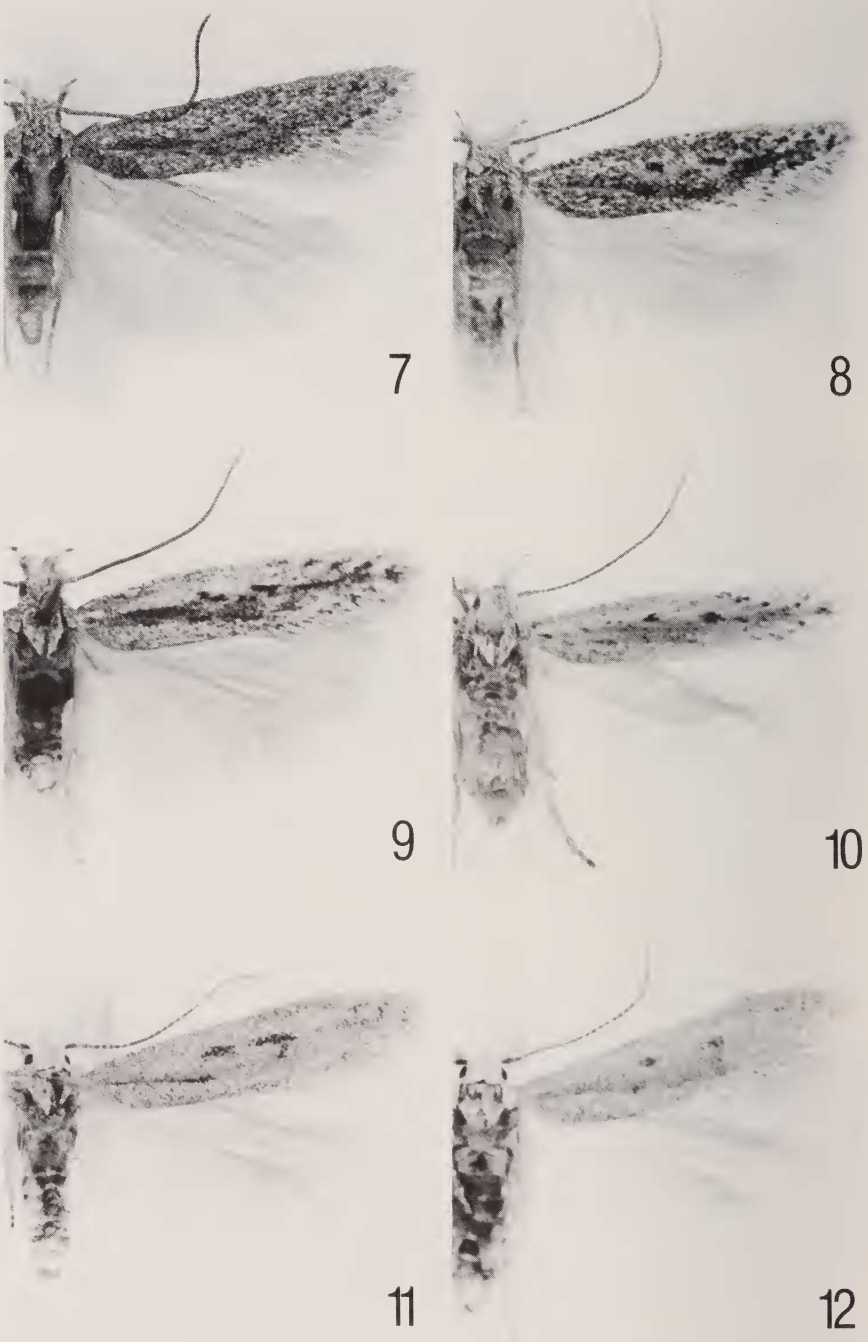
Key to species, females
(differences between *diffluella*, *ramosella* and *tussilaginis* are weak)

1. Antrum slim, gradually tapered (figs. 38–39) ..... *S. psilella*
— Antrum moderately broad, short, distal part irregularly tapered (figs. 40–43) 2

2. Signum long and slender (figs. 41, 47) ..... *S. ramosella.*
— Signum shorter, comparatively stout (figs. 44–46, 48–49) 3



Figs 1–6. Adults of *Scrobipalpula*: 1–2 — *S. psilella* (1 — ♂, Denmark, Bornholm, 13 mm; 2 — ♀, Denmark, Anholt, 11 mm); 3–4. — *S. ramosella* Schweiz, Zermatt (3 — ♂, 14 mm, 4 — ♂, 13 mm); 5–6 — *S. diffluella* (5 — ♂, Austria, Tirol, 12 mm, 6 — ♀, Norway, Kongsvold, 11 mm).



Figs 7–12. Adults of *Scrobipalpula*: 7–10 — *S. diffluella* (7 — ♂, Sweden, Uppland, 11 mm, 8 — ♀, Sweden, Uppland, 10 mm; 9 — ♂, Austria, Tirol, 11 mm, 10 — ♀, Austria, Tirol, 10 mm); 11–12 — *S. tussilaginis*, Great Britain, Dorset (11 — ♂, 14 mm; 12 — ♀, 13 mm).

3. Antrum irregularly tapered, corpus bursae short (fig. 40) ..... *S. diffluella*.
— Antrum abruptly tapered, corpus bursae long (figs. 42–43) ... *S. tussilaginis*.

Scrobipalpula psilella (Herrich-Schäffer, 1854)

Gelechia psilella Herrich-Schäffer, 1854: 171.
Gelechia nocturnella Staudinger, 1859: 241.
Lita pallidella Heinemann, 1870: 252.
Gelechia killiasii Frey, 1880: 362.
Gnorimoschema psilellum astericolellum Hering, 1957: 135 (nomen nudum).
Scrobipalpula psilella ssp. *asiatica* Povolný, 1968: 17.

Material examined. *Switzerland*: lectotype *Gelechia killiasii* ♀ "LECTOTYPE" "G. killiasella vid. Frey Wallis (Anderegg)." "Frey Coll. Brit.Mus. 1890–62." "Lectotype. ♀ Gelechia killiasii Frey teste K.Sattler. 1961" "B.M. ♀ Genitalia Slide No. 7284" (BMNH). *Germany*: Holotype *Lita pallidella* ♀, "Gartz a. Oder, 1869, Von Hein. Beschr., Hein 367" "Stettin, Bütt." "Orign." "Scrobipalpula psilella H.Sch., det. Povolný" "slide St. 689" (ZMHB). *Spain*: Lectotype *Gelechia nocturnella* ♂, "18/3" "161" "Chiclana m." "Origin." "nocturnella" "St. 701" "Scrobipalpula psilella (H.Sch.) det. Povolný" (ZMHB). *Denmark*: ♂, 2 ♀, Glatved, 27.vii.1975, leg. Lundqvist; ♂, ditto, but 2.viii.1974 (TLMF); 2 ♂, 3 ♀, B, Melsted, la. vii.1923 and 1925 (*Artemisia campestris*), leg. Gudmann (slides NLW 1953♂, HH 1651♂, HH1663♀); ♂, B, Parsdisbakkerne, 24.vii.1976, leg. Karsholt (slide OK 3448♂); ♀, LFM, Bøtø, la. vi.1936 (*Gnaphalium*), leg. Sønderup; ♂, NEZ, Melby Overdrev, 9.vi.1971, leg. Karsholt (slide OK 717 ♂); + 74 ♂, 27 ♀ from different localities in Denmark (all ZMUC). *Sweden*: 2 ♂, Öl, Tocknekär, 28.vii.1975, leg. Karsholt; ♂, Öl, Seberneby, 29.vii.1975, leg. Karsholt (ZMUC). *Austria*: ♀, Niederösterreich, Dürnstein, e.l. iii.1942 (*Aster amellus*), leg. Klimesch; 10 ♂, Nordtirol, Innsbruck, 11.vi.1947, leg. Burmann; 2 ♂, ♀, ditto, but 15.vi.; ♂, ditto, but 7.v.1947; ♂, ditto, but e.l. 4.vi.1944, leg. Hernegger; ♀, Halltal, 1200 m, 14.vii.1981, leg. Burmann; ♂, Fließ, 1000 m, 29.iii.1976, leg. Burmann; ♂, ditto, but 11.iv.1981; ♂, ditto, but 25.iv.1987, leg. Burmann & Huemer (coll. Burmann, Innsbruck; TLMF). *Germany*: ♂, Württemberg, Marbach/Neckar, e.l. 3.v.1977 (*Artemisia vulgaris*), leg. Süssner (TLMF); 3 ♂, Frankfurt a. M. (ZMUC). *Poland*: ♀, Breclav, 24.iv.1910 (coll. Burmann, Innsbruck); 2 ♂, Breclav, 28.v.1906 (ZMUC). *Italy*: ♂, ♀, Südtirol, Laas, 800 m, 26.ix.1985, leg. Burmann; 2 ♂, ♀, Südtirol, Naturns, 550 m, 7–8.viii.1959, leg. Burmann; ♂, Prov. Verona, Monte Baldo, San Valentino, 1200 m, M.v.1969, leg. Burmann (coll. Burmann, Innsbruck; TLMF); ♂, Piemonte, Valsusa, Villardora, 500 m, 4.vi.1993, leg. Bassi (slide HH 1406♂) (ZMUC). *France*: ♀, Hautes-Alpes, La Bessée, 1100 m, 21.vii.1961, leg. Burmann (coll. Burmann, Innsbruck); ♂, ♀, Provence, La Bessée, 1200 m, 8.v.1972, leg. M. & U. Glaser (LNK; ZMUC); ♂, ♀, Bretagne, Vannes (ZMUC). *Spain*: ♂, ♀, Almería, Mini Hollywood, 230 m, 14–15.x.1992, leg. Fibiger (slides HH 1653♂, 1659♀) (ZMUC). *Turkey*: ♂, Prov. Kayseri, 5 km N Incesu, 1250 m, 30.vii.1989, leg. Fibiger & Esser (slide HH 1396 ♂); ♂, Prov. Ağrı, 5 km W Eleşkirt, 2000 m,

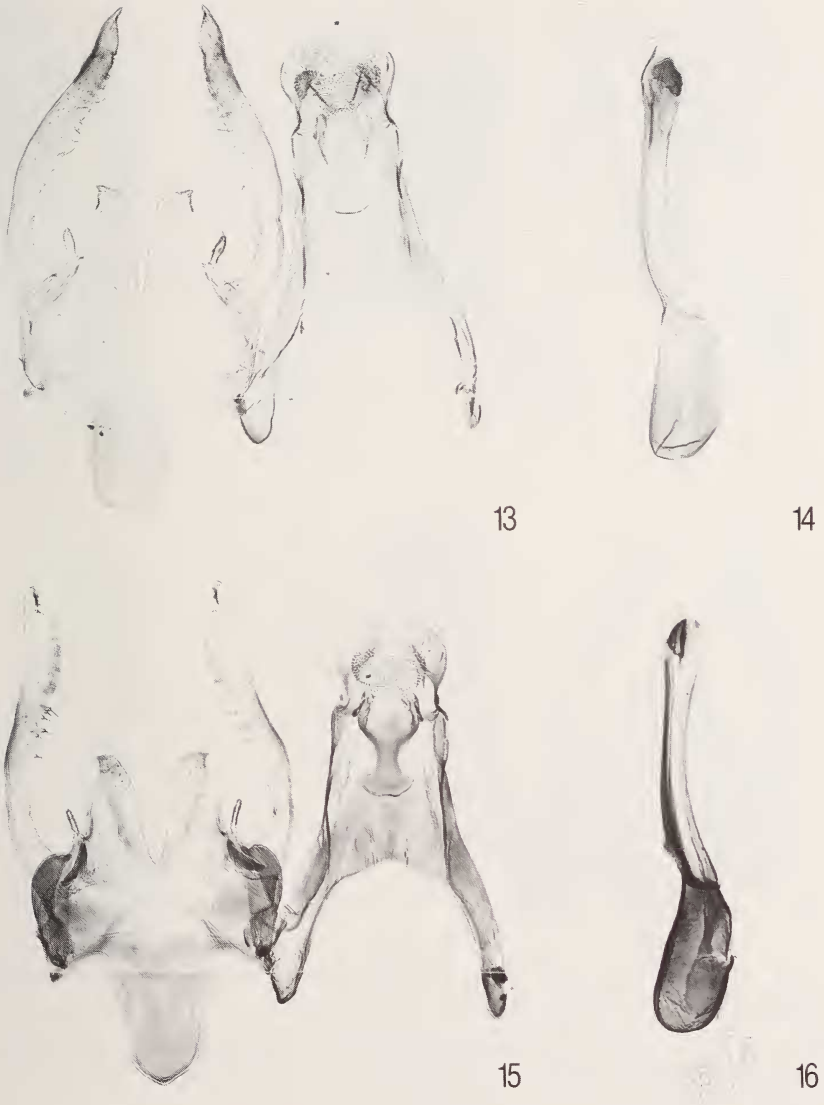
4.ix.1993, leg. Fibiger (slide HH 1393♂) (ZMUC); 2 ♂, Prov. Ağrı, 23 km W Doğubayazıt, 1800 m, 5.ix.1993, leg. Fibiger; ♂, Prov. Kars, Mt. Ararat, 2 km N Çilli Geçidi, 1500 m, 6.ix.1993, leg. Fibiger; ♂, Prov. Kars, 3 km E Karakurt, 1450 m, 12.ix.1993, leg. Fibiger; Prov. Erzerum: ♂, Prov. Erzurum, Kopdağı Geçidi, 1750 m, 15–16.ix.1993, leg. Fibiger; ♂, 50 km NE Erzerum, 1600 m, 17.ix.1993, leg. Fibiger (slide HH 1399♂); 2 ♂, Prov. Erzurum, Kopdağı Geçidi, 2300 m, 20–22.viii.1993, leg. Schepler (HH 1394♂) (all ZMUC). *Russia*: ♂, ♀, SW Altai, Katun valley, 10 km W Katanda, 1200 m, 26–27.vii.1983, leg. Mikkola, Hippa & Jalava (slide HH 1657 ♂) (ZMUH); ♂, Primorskij Kraj, Shkotovo distr., Anisimovka, 16.vii.1994, leg. Savenkov (slide HH 1665 ♂) (ZMUC). *Nepal*: ♂, Ganesh Himal, Kathmandu, 1330 m, 27.x.1995, leg. Fibiger (slide HH 1658♂), ♂, Gandaki, Tukuche, 2650 m, 5.viii.1996, leg. Fibiger (slide OK 4869 ♂) (ZMUC), 11 ♂, 8 km SE Jornson, Thadung, 3500 m, 7.viii.1996, leg. Fibiger (ZMUC).

Male (fig 1): Wingspan 12–13 mm. Head light to dark greyish brown. Thorax darker than head. Antenna dark greyish brown, weakly ringed with lighter brownish on upperside, distinctly paler ringed on underside. Labial palps recurved; second joint with short rough scales, on outside grey-brown with light yellow bands in middle and in distal part; third joint pointed, dark with light yellow band in middle and at tip. Forewing elongate, dorsal half blackish brown, costal half lighter, both parts more or less intensely mottled with light scales. An ill defined, dark brownish streak from base through middle of wing almost to apex (worn specimens tend to become more uniform greyish brown); two prominent black stigmata at 1/3 and 2/3 on border between dark and light part of wing, and two more indistinct stigmata in the fold. Fringes mottled grey without distinct fringe line. Hindwing light greyish brown.

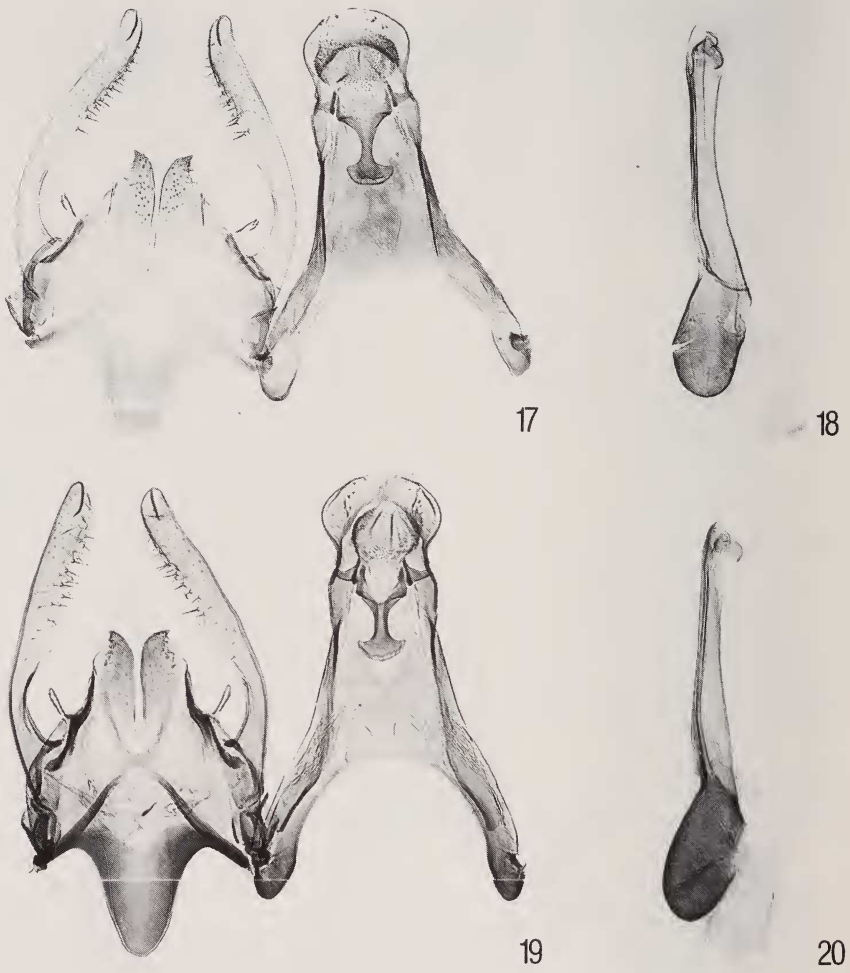
Female (fig. 2) slightly smaller than male (9–12 mm), with slightly more slender wings, and having more contrast between dorsal (dark) and costal (light) part of forewing.

Male genitalia (figs. 13–16, 29–30). Genital armature elongated. Uncus broadly rounded; gnathos hook spatulate, medially constricted to about 0.5 times width of distal spatula. Valva long, exceeding uncus, distally slightly and gradually dilated, apex pointed; sacculus short, digitate. Posterior margin of vinculum with prominent paired process, separated by deep V-shaped incision, apex with outwardly curved tip. Saccus broad, subrectangular. Aedeagus long and slender with subterminal plate.

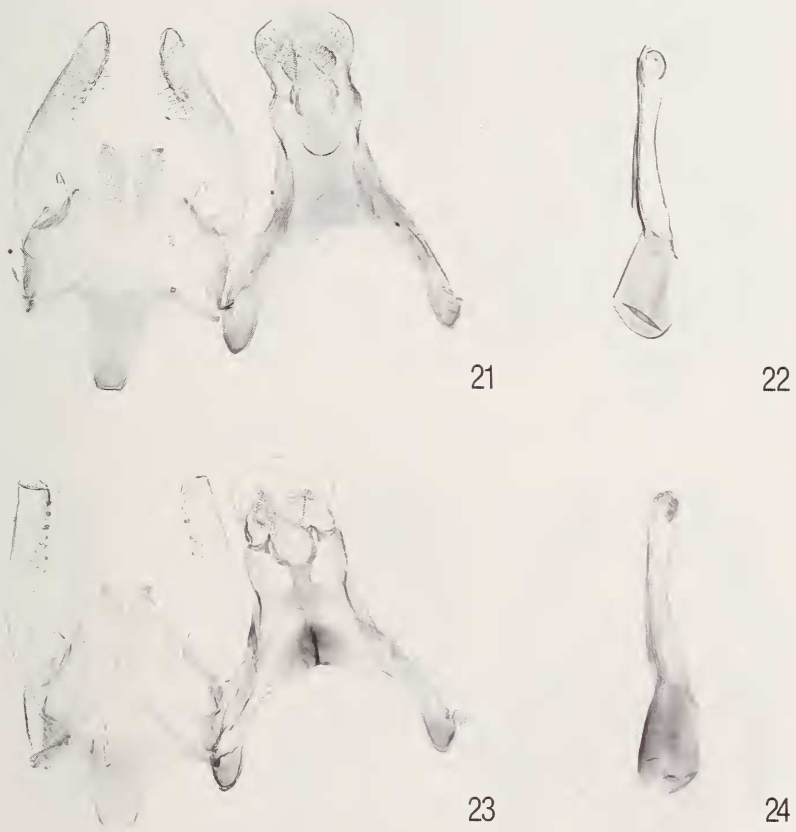
Female genitalia (figs. 38–39, 44–45). Segment VIII ventromedially with distinct honeycomb sculpture, medially separated by membranous



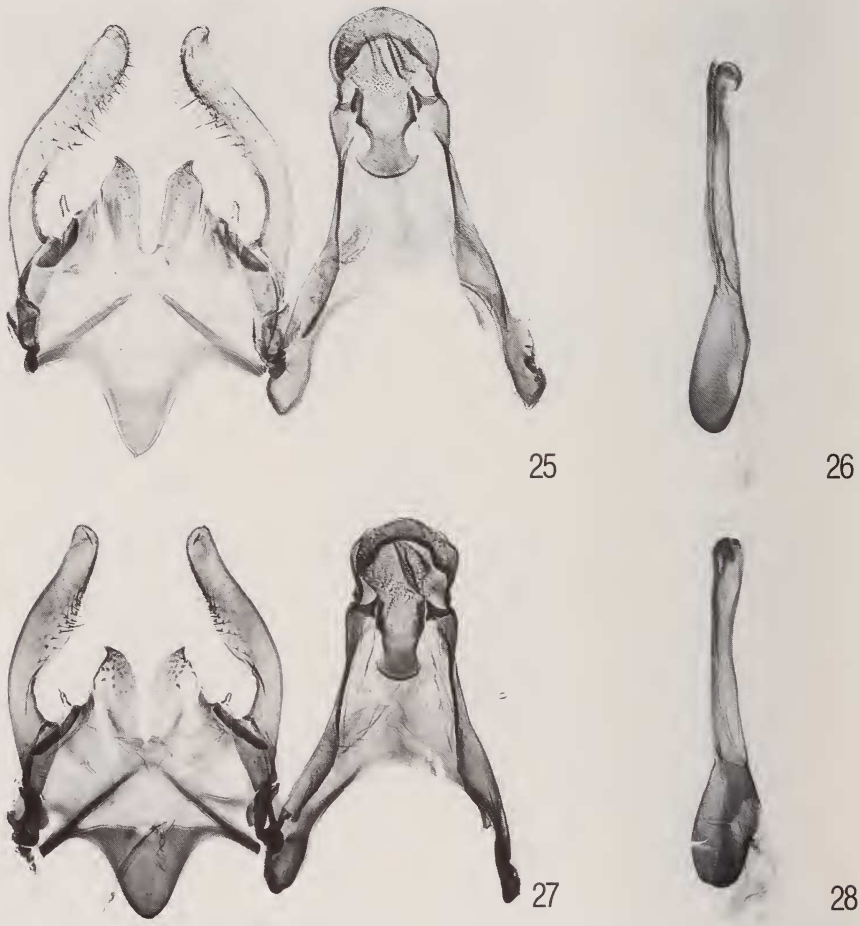
Figs 13–16. *S. psilella*, male genitalia: 13 — Austria, Tirol, GEL 47 ♂ m; 14 — ditto, aedeagus; 15 — Austria, Tirol, GU 95/541 ♂; 16 — ditto, aedeagus.



Figs 17–20. *S. ramosella*, male genitalia: 17 — Switzerland, Valais, GU 95/533 ♂ P. Huemer; 18 — ditto, aedeagus; 19 — Switzerland, Valais, GU 95/532 ♂ P. Huemer; 20 — ditto, aedeagus.



Figs 21–24. *S. diffluella*, male genitalia: 21 — Austria, Tirol, GEL 45 ♂; 22 — ditto, aedeagus; 23 — Austria, Tirol, GEL 49 ♂; 24 — ditto, aedeagus.



Figs 25–28. *S. tussilaginis*, male genitalia: 25 — Austria, Tirol, GEL 616 ♂; 26 — ditto, aedeagus; 27 — England, GEL 622 ♂; 28 — ditto, aedeagus.

and weakly sculptured zone. Antrum moderately slim, long and evenly tapered, funnel-shaped. Ductus bursae with small colliculum. Corpus bursae pear-shaped, indistinct minute spining, with distinct, slender, hook-like signum.

Remarks. *Gelechia psilella* was described from an unspecified number of specimens collected in the surroundings of Glogau (now Głogów, Poland) (Herrich-Schäffer, 1854). We have not been able to trace any type material, but the identity is restricted to the species dealt with here as *psilella*, based on: 1) the host plant *Helichrysum arenarium* mentioned in the original description (none of the other *Scrobipalpula* have been recorded from this plant); 2) the type locality; 3) the figure (fig. 496) in Herrich-Schäffer's work (even though it is not very accurate).

Gelechia nocturnella was described from an unspecified number of specimens collected in Andalusia (Staudinger, 1859). It was already treated as a junior synonym of *psilella* by Vives Moreno (1992). This synonymy is confirmed by a male syntype, which is here designated as the lectotype.

The identity of *Lita pallidella* Heinemann, 1870 was recently established (Karsholt, 1995).

Gelechia killiasii was described from an unspecified number of specimens collected in the Valais by Anderegg (Frey, 1880). Of the two syntypes in the BMNH, a female, already labelled lectotype by Sattler, is here designated as such.

In contrast to Povolný (1964), we found reliable genitalic differences between *psilella* and the other central and northern European taxa of this species complex. The male genitalia of *psilella* are particularly characterized by the long valva, weakly broadened distally and pointed at the apex, which distinctly exceeds the uncus. The female genitalia differ from related taxa by the gradually tapered and very long antrum. We have observed a slight infrasubspecific variation in male genitalia of *psilella*, especially in the form of uncus and gnathos. One male from the Danish island of Bornholm has the valvae shorter and broader than normally (but not as short and broad as in *diffluella* and *tussilaginis*). The specimen was bred from *Artemisia campestris*, and other specimens from the same series have genitalia typical for *psilella*.

Povolný (1968) described specimens from Afghanistan as subspecies *asiatica*. Such specimens were stated to be ashen in colour. From Povolný's (*op. cit.*) drawing of a forewing and of male genitalia it

seems to fall within the range of variation for *psilella*. Specimens studied by us from Nepal have more dark greyish forewings, thus the separation of the forewing in a lighter costal part and a darker dorsal part is blurred. Specimens from mountains of eastern Turkey are intermediate between European and Nepalese ones, whereas those from Altai are similar to European specimens. The single specimen studied from East Asia has darker forewings, thus resembling the nominal form of *diffluella*. However, its genitalia are typical for *psilella*. As long as only male specimens of *Scrobipalpula* are known from Asia, and no information on their bionomics is available from there, we find it most appropriate not to try to separate any populations by giving them subspecific or specific status. Apparently, Povolný came to the same conclusion as in a recent paper (1996) on Gnorimoschemini from Palaearctic Asia, he recorded *psilella* from mountains of Kyrgyzstan and from Siberia, without any reference to his subspecies *asiatica*.

S. psilella has formerly been confused with *Scrobipalpa artemisiella* (Treitschke, 1833), and records of this *Thymus*-feeding species from *Artemisia* (hence its specific name) almost certainly refer to *psilella*. In *artemisiella*, the forewings are generally darker brown than in *psilella*, with a tendency to become lighter towards base (in *psilella* the forewings become lighter towards costa).

Bionomics. The larva is green with darker green warts; head brownish-yellow with a black spot near the ocelli, and another behind; prothoracic shield greenish-yellow (Benander, 1928). However, Hering (1957) described the larva as unicolorous light grey. It feeds on *Artemisia campestris* in two generations. According to Hering (1891) the larva feeds probably on basal leaves of *Artemisia campestris* from a long silken tube on the ground surface. However, Hering (*op. cit.*) explicitly states that this habit only applies to the sea-shore and not to inland habitats. Additional host plants are: *Helichrysum arenarium* (Herrich-Schäffer, 1854), *Artemisia maritima* and *A. vulgaris* (Povolný & Bradley, 1965). Povolný (1964) also gives *Aster amellus* and *Achillea* as host plants, but the latter may refer to another taxon. Hering (1957) further lists *Anthemis* sp., which should be confirmed, and *Aster amellus*. The latter is mentioned under *Gnorimoschema psilellum astericolellum* Klimesch, which is a nomen nudum.

Distribution. Widely distributed throughout Europe and Asia. Records from England (Povolný & Bradley, 1965) are dubious; those from the Netherlands (Huisman & Koster, 1997) refer to *S. tussilaginis*. In

the Alps up to an altitude of about 1200 m. Furthermore recorded from North Africa (Povolný, 1971) and Japan (Povolný, 1996). According to Povolný (1987) also in the Nearctic region and in Patagonia. However, these records are very doubtful and genitalia figured by Povolný (*op. cit.*) show slight differences compared with European specimens of *psilella*.

***Scrobipalpula ramosella* (Müller-Rutz, 1934) sp. rev.**

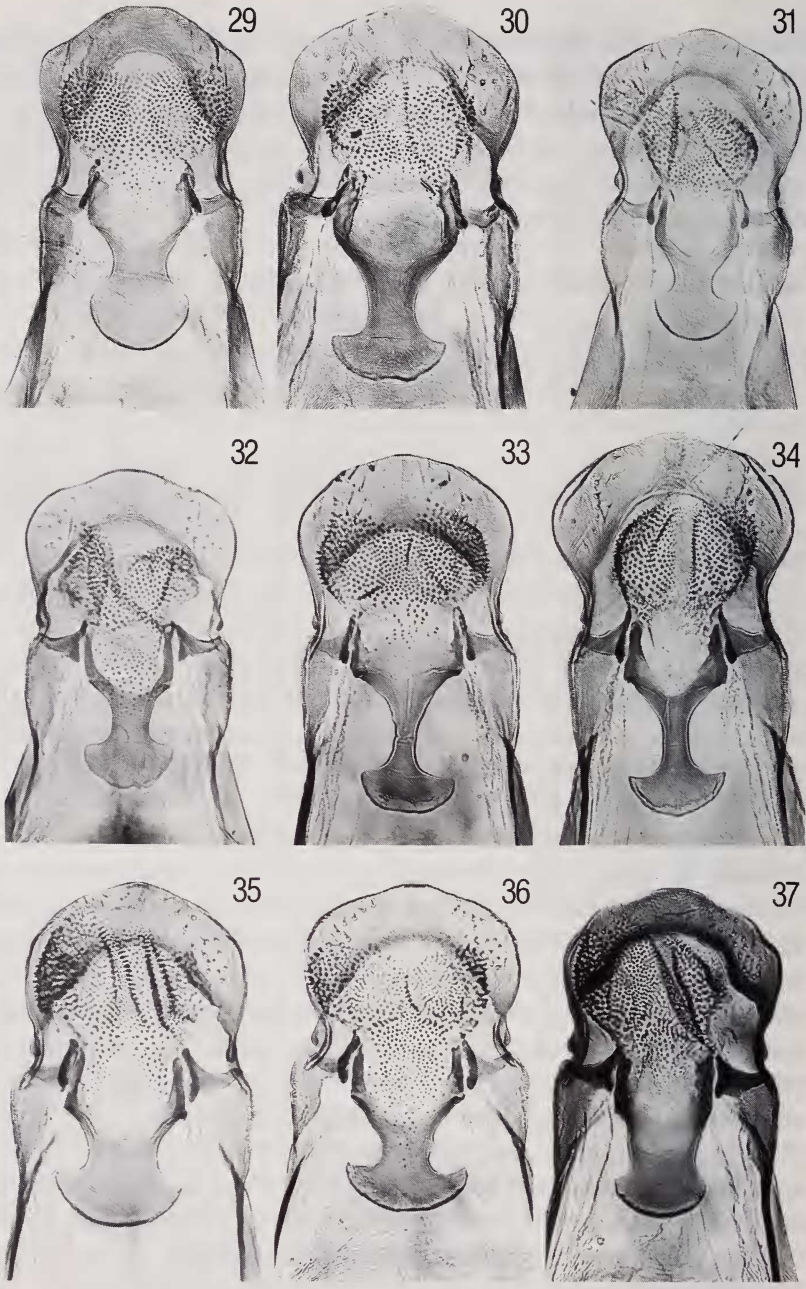
Lita ramosella Müller-Rutz, 1934: 120.
Gnorimoschema ptarmicae Hering, 1957: 27 (nomen nudum).
Scrobipalpula psilella f. *compositella* Povolný, 1964: 343 (unavailable, ICZN Art. 16).

Material examined. *Switzerland*: Lectotype *Lita ramosella* ♂ "Type" "Zermatt Triftschlucht 26.VII.31. 10934 ♂" "GU 95/532 ♂ P. Huemer" "Lectotypus ♂ Lita ramosella Müller-Rutz desig. P. Huemer, 1995" (ETHZ); ♂ Wallis, Zermatt, above Schwarzsee, 2700 m, 5.vii.1937, leg. Weber (GU 95/533 (PH); ♂, Zermatt, 8.viii.1932, leg. Weber (paralectotype); ♂, Zermatt ob Bvolmen, 7.viii.1937, leg. Weber (slide W. Sauter 2895) (all ETHZ); ♂, ♀, Graubünden, S. Bernardino pass, 2350 m, e.l. early v.1992 (*Erigeron*), leg. Huemer (TLMF). *Greece*: 2 ♂, ♀, Olymp, Kataphygion A1, 2500 m, e.l. 10–15.viii.1962 (*Centaurea pindicola*), leg. Kasy (slide Mus.Vind.15.303♂) (NMV); ♀, ditto, but 2100 m, e.l. 10.viii.1962 (*Achillea holosericea*) (NMV). Doubtful identity: *Macedonia*: ♂, Treska Schlucht, ex l. 11.ix.1963 (*Achillea ageratifolia serbica*), leg. Klimesch (slide Mus. Vind. 15.304♂) (NMV).

Adult (figs. 3–4) slightly larger than *diffluella* and *psilella* (♂ 13–14 mm, ♀ 11–13 mm). Resembling *psilella* in having dorsal half of forewing darker than costal light part, but differing in that the white scales are not as scattered as in *psilella*. Antenna on upperside rather uniformly dark brown.

Male genitalia (figs. 17–20, 33–34). Genital armature relatively long. Uncus broadly rounded; gnathos hook spatulate, medially strongly constricted to about 0.25 times width of distal spatula. Valva long, at most level with uncus, distally slightly and almost evenly dilated, apex rounded; sacculus short, digitate. Posterior margin of vinculum with prominent paired process, separated by deep and almost parallel-sided incision, apex with outwardly curved tip. Saccus broad, subtriangular. Aedeagus slender with subterminal hooklet.

Female genitalia (figs. 41, 47). Segment VIII ventromedially with distinct honeycomb sculpture, medially separated by membranous and weakly sculptured zone. Antrum short, distal part abruptly tapered,



Figs 29–37. *Scrobipalpula* spp., male genitalia, (uncus-gnathos enlarged): 29 — *S. psilella*, Denmark, GEL 629 ♂; 30 — ditto, Austria, Tirol, 95/541 ♂; 31 — *S. diffluella*, Austria, Tirol, GEL 45 ♂; 32 — ditto, Austria, Tirol, GEL 49 ♂; 33 — *S. ramosella*, Switzerland, Valais, GU 95/532 ♂ P. Huemer; 34 — ditto, lectotype, Switzerland, Valais, GU 95/533 ♂ P. Huemer; 35 — *S. tussilaginis*, Austria, Tirol, GEL 616 ♂; 36 — ditto, Austria, Tirol, GEL 631 ♂; 37 — ditto, England, GEL 622 ♂.

funnel-shaped. Ductus bursae with small colliculum. Corpus bursae pear-shaped, distinct minute spining, with long and slender, weakly hook-like, signum.

Remarks. *Lita ramosella* was described from 3 specimens from Zermatt (Valais, Switzerland). The type material was collected at light from late July to early August 1931–1932 by P. Weber (Müller-Rutz, 1934). Two syntypes have been examined and the male already labelled "type" is designated here as the lectotype.

The identity of this species was discussed by Sauter (1961), who also figured the male genitalia. In that paper, *ramosella* was treated as a valid species mainly based on external differences and the sympatric occurrence with *diffluella* in the neighbourhood of Zermatt.

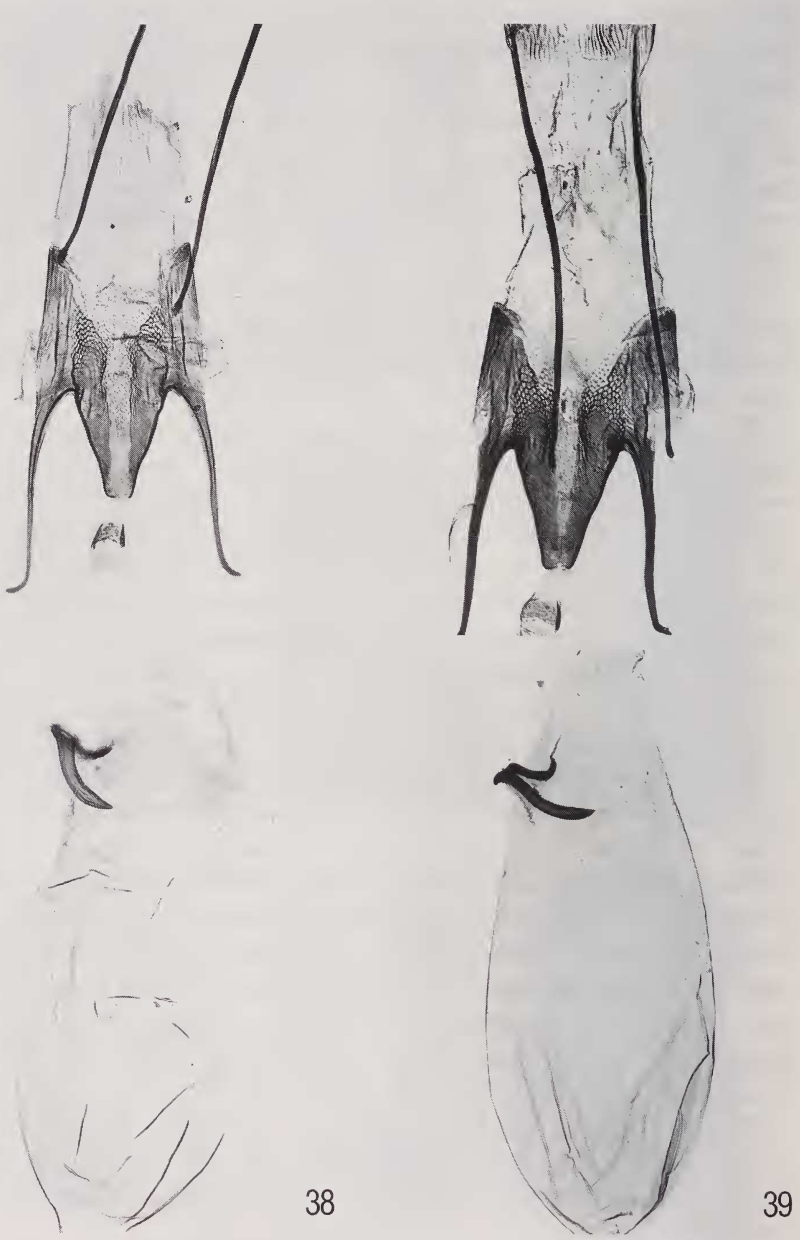
The few specimens examined by us displayed some distinct genitalic characters. The male genitalia are particularly characterized by the medially strongly constricted gnathos hook. Although this character varies in the other taxa to a certain degree, intermediate forms have not yet been found. *S. ramosella* furthermore differs from *diffluella* in the less abruptly tapered valvae and the distally more rounded saccus. The female genitalia have a very long and slender signum. Therefore, it seems most appropriate to treat *ramosella* as a valid species at present.

Scrobipalpula psilella f. *compositella* Povolný, 1964 from Macedonia and northern Greece has, according to the figure of the male genitalia in the original description, a gnathos similar to *ramosella*. The forewings are stated to be richer in contrast. Moths were bred from leaves of *Ptarmica ageratifolia* and *Centaurea pindicola*. They are probably conspecific with specimens from *Achillea ageratifolia* published by Hering (1957) under the name *Gnorimoschema ptarmicae*, a nomen nudum. We have examined a single specimen from Macedonia, whose identity cannot be assessed with certainty at present. A small series from Greece is clearly related to *ramosella*, though possibly distinct. However, the latter material is regarded as conspecific with *ramosella* until further information becomes available.

Povolný (1967b) treated *ramosella* as a form of *Scrobipalpula henshawiella* (Busck, 1903) from North America. However, the signum figured by Povolný (*op. cit.*, fig. 58) is much shorther than in European *ramosella*.

Bionomics. The larvae were observed mining leaves of *Erigeron* sp. and spinning them together. Specimens from Greece were bred from *Centaurea pindicola* and *Achillea holosericea*.

Distribution. Switzerland, Greece; restricted to mountainous areas.



Figs 38–39. *Scrobipalpula psilella*, female genitalia: 38 — Denmark, GEL 628 ♀; 39 — Italy, Südtirol, GEL 618 ♀.

Scrobipalpula diffluella (Frey, 1870)

Gelechia diffluella Frey, 1870a [April]: 252.
Gelechia cacuminum Frey, 1870a: 252.
Lita diffluella Heinemann, 1870 [Dec. 31]: 247.
Phthorimaea diffluella v. *bellidiastri* Klimesch, 1951: 105.
Gnorimoschema uniflorellum Hering, 1957: 419, 542 (nomen nudum).

Material examined. *Switzerland*: Lectotype *Gelechia diffluella* ♂ "LECTOTYPE" "G. diffluella Mann. Zermatt Riffelb." "Frey Coll. Brit.Mus. 1890–62." "Lectotypus ♂ Gelechia diffluella Frey Select.: K. Sattler, 1961" "B.M. ♂ Genitalia Slide No. 7301" (BMNH). Lectotype *Gelechia cacuminum* ♂ "LECTOTYPE" "G. cacuminum Frey Engadin" "Frey Coll. Brit.Mus. 1890–62." "Lectotypus ♂ Gelechia cacuminum Frey Select.: K. Sattler, 1961" "B.M. ♂ Genitalia Slide No. 7300" (BMNH); ♂, Graubünden, Schafberg, 2100 m, 20.vi.1942, leg. Thomann (TLMF). *Italy*: 5 ♂, Trentino, Adamello, Mandron, 2500 m, 4–7.vii.1969, leg. Burmann; 2 ♂, ♀, ditto, but 2800 m, E.vii.1967 (coll. Burmann, Innsbruck; TLMF); 3 ♂, Wallis, Gornergrat, 31.vii.1932, leg. Weber; 1 ♂, ♀, Wallis, Triftkumm, 2600 m, 6.viii.1932, leg. Weber (ETHZ). *Austria*: ♂, Nordtirol, Nordkette, 2100 m, 5.vi.1947, leg. Burmann; ♂, 2 ♀, ditto, but 2100–2200 m, 2.vii.1944; ♂, ditto, but 9.viii.1940; ♂, ditto, but 2300 m, 23.v.1948; ♂, Nordtirol, Nordkette 2000–2100 m, 2.vii.1944 leg. Burmann (slide PH GEL 45♂); ♂, ditto, but 13.vi.1947 (TLMF); ♂, Nordtirol, Ötztal, Rofenberg, 2400 m, e.l. iii.1943 (*Aster alpinus*), leg. Klimesch (TLMF); 4 ♂, 3 ♀, ditto, but 2600 m (*Erigeron uniflorus*) (ETHZ; TLMF; ZMUC); ♂, Nordtirol, Samoarhütte, 3000 m, 4.viii.1948, leg. Burmann; ♂, Nordtirol, Franz Sennhütte, 2300 m, 10.vi.1950, leg. Burmann; ♂, ditto, but 2700 m, 17.vi.1949; 3 ♂, Nordtirol, Leutkircherhütte, 2300 m, 11.vii.1941, leg. Burmann; 2 ♂, Osttirol, Virgental, Venedigergruppe, Sajatmähder E, 2450–2500 m, 10.vi.1993, leg. Tarmann (coll. Burmann, Innsbruck; TLMF); 3 ♂, ♀, Osttirol, Lienz, above Dolomitenhütte, 1600–2100 m, 16.vii.1989, leg. Karsholt (slide OK 4648 ♂) (ZMUC). *Norway*: ♂, On, Vågåmo, 4.vii.1983 leg. Schnack; ♂, STi, Kongsvold, 900–1100 m, 20–28.vii.1983, leg. Karsholt & Michelsen (slide OK 4291 ♂), 4 ♂, 12 ♀, ditto but 12–20.vi.1985 (slide HH 1079 ♂, HH 1624 ♂, OK 4436 ♂); ♂, ditto, but 5.vii.1983, leg. Schnack; 2 ♂, 2 ♀, ditto, but 13–15.vi.1985 (all ZMUC). *Sweden*: 5 ♂, ♀, Upl., Älvkarleby, e.l. vii.1948 (*Erigeron acre*), leg. Brandt (slide HH 1660 ♂) (MZLU); ♂, Gtl., Martebomyr, 30.vii.1985, leg. Karsholt (slide OK 4823 ♂). *Finland*: ♂, Ks, Kuusamo, Liikasenvaara, 11.vi.1970, 2 ♂, 2 ♀, ditto, but 16.vi.1974, leg. Kyrki (slides HH 1632 ♀, JK 318, 779, 780) (ZMOF). *Latvia*: ♂, Livon. ?leg. Lienig (Zeller coll.) (BMNH).

Adults (figs. 5–10). A rather variable species which occurs in a dark and a light form (with some intermediate forms). Slightly smaller than other *Scrobipalpula* species (♂ 10–12 mm, ♀ 9–11 mm). Upper part of head and thorax of same colour. Forewing not separated in dorsal

dark and costal light part — but in some specimens with a blackish brown streak from base to apex.

Nominal form with rather uniform dark brown forewings with 2–3 streaks of ochreous scales and scattered white-tipped scales (in females with many white-tipped scales), and 3–4 more or less distinct black stigmata. Forewing of this form not divided in dorsal dark and costal light part — only a blackish brown streak in apex may be present.

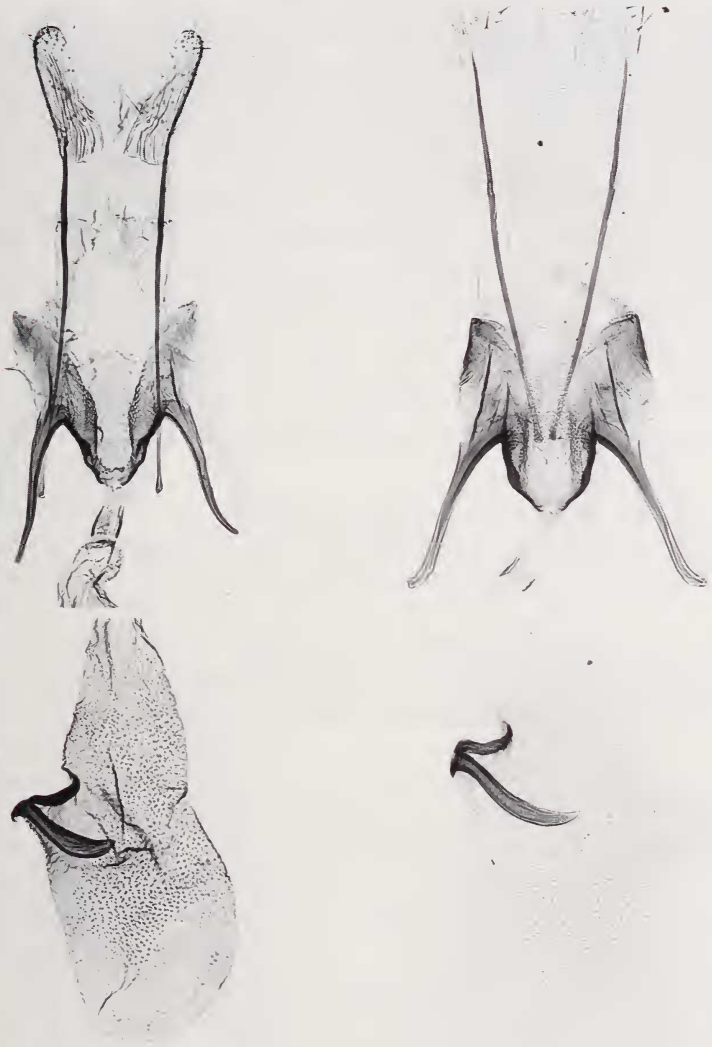
In the light form palps, head, thorax and forewings are covered with whitish or light ochreous scales (especially along costa and dorsum) with distinct black stigmata. Some specimens have a blackish brown streak from base to apex. This form is only known from the Alps and was named *bellidiastri* by Klimesch (1951).

Frey (1870a) stated the female of *diffluella* to be brachypterous ("mit verkümmerten Flügeln"). Klimesch (1951) even described small differences in wing shape between *diffluella* and its form *bellidiastri*. In the females of *diffluella* studied by us, the shape of the wings is only slightly different from the male — as in *psilella* — (forewing being a little narrower and pointed towards apex, and hindwing slightly slenderer), and not to an extent that we would use the term brachypterous. However, it is not uncommon among Lepidoptera with females having tendency to wing reduction that the wing shape shows some variation.

Male genitalia (figs. 21–24, 31–32). Genital armature short. Uncus broadly rounded; gnathos hook spatulate, medially constricted to about 0.5 times width of distal spatula. Valva rather long, at most level with uncus, distally strongly and abruptly dilated, apex rounded; sacculus very short, digitate. Posterior margin of vinculum with prominent paired process, separated by deep and almost parallel incision, apex with outwardly curved tip. Saccus broad, subrectangular. Aedeagus slender with subterminal hooklet.

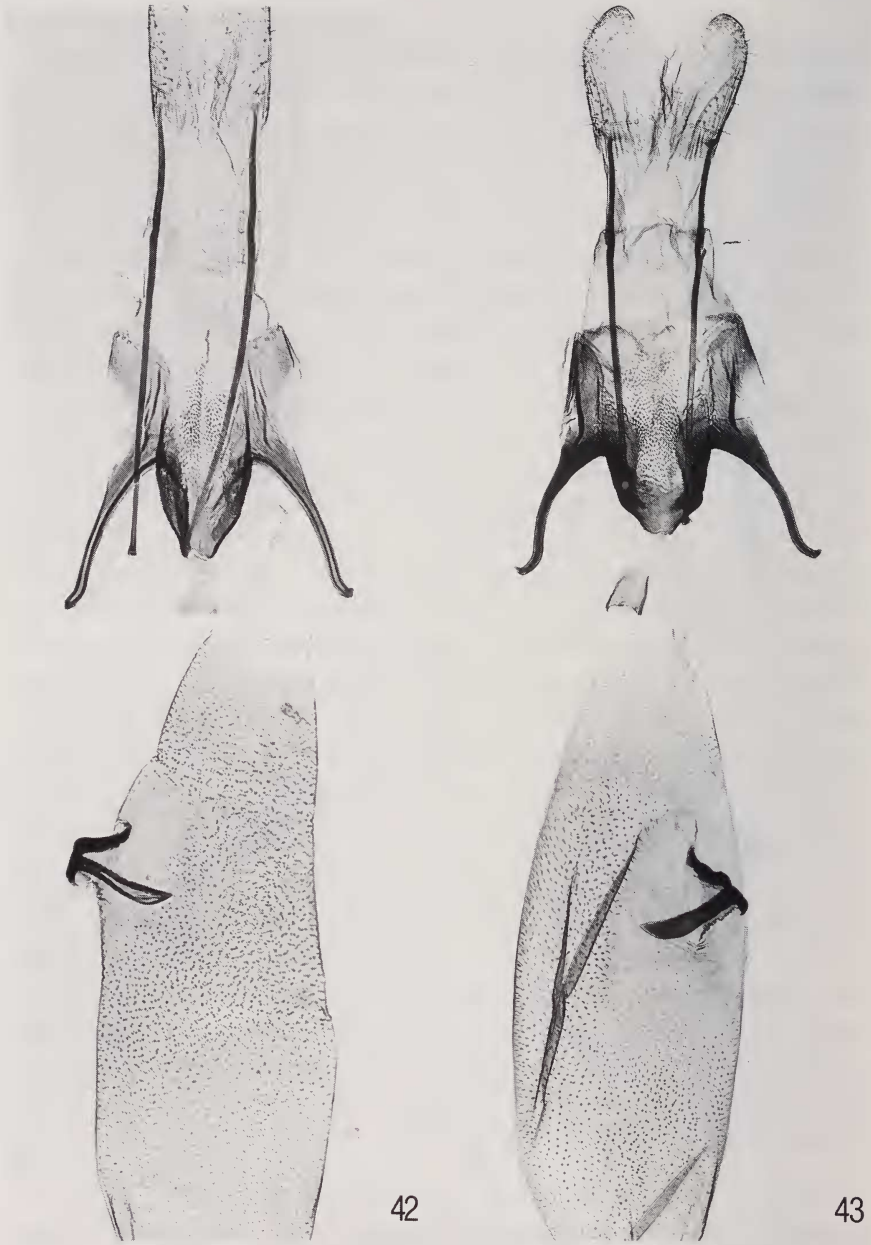
Female genitalia (figs. 40, 46). Segment VIII ventromedially with distinct honeycomb-like sculpture, medially separated by membraneous and weakly sculptured zone. Antrum short, irregularly tapered, funnel-shaped. Ductus bursae with small colliculum. Corpus bursae short, pear-shaped, distinct minute spining, with distinct, distally slightly dilated, hook-like signum.

Remarks. *Gelechia diffluella* was described from a number of specimens of both sexes collected in the surroundings of Zermatt (Switzerland) in mid-July 1869 and a further male specimen from the Berner Alps (Frey, 1870a). A male syntype, already labelled lectotype by Sattler, is here designated as such.



40 41

Figs 40–41. *Scrobipalpula* spp., female genitalia: 40 — *S. diffluella*, Austria, Tirol, GEL 619 ♀; 41 — *S. ramosella*, Switzerland, Graubünden, GEL 627 ♀.



Figs 42–43. *Scrobipalpula tussilaginis*, female genitalia: 42 — Austria, Tirol, GEL 617 ♀; 43 — England, GEL 623 ♀.

Gelechia cacuminum, described on the same page as *diffluella*, was compared with *Gelechia murinella* Herrich-Schäffer (currently *Scrobipalpa murinella* (Duponchel, 1843)) but stated as distinctly smaller (Frey, 1870a). Povolný (1967a) synonymized *cacuminum* with *murinella*, but in a correction leaflet to his paper he withdrew this nomenclatural act, based on the examination of type-material. The lectotype, already labelled as such by Sattler, is conspecific with *diffluella*, whereas other syntypes belong to *murinella*. Frey (1870a) clearly intended to name two different taxa when describing *diffluella* and *cacuminum*. However, to avoid further misunderstandings, we follow here the interpretation of Povolný (1967a) and Sattler that both are conspecific. *S. cacuminum* in the sense of various authors such as Burmann (1951), Huemer & Tarmann (1993) and Klimesch (1943) is conspecific with *Scrobipalpa murinella*. Further synonyms of *S. murinella* are *Gelechia culminicolella* Staudinger, 1871 (we have studied a female syntype) and *Lita pygmaeella* Heinemann, 1870.

Phthorimaea diffluella v. *bellidiastri* was described from an unspecified number of specimens collected in higher mountainous regions of eastern Austria (Klimesch, 1951). The original genitalia figures indicate the conspecificity with *diffluella*.

The male genitalia of *diffluella* are mainly charcterized by the abruptly dilated and distally rounded valvae and the subrectangular saccus. The female antrum is irregularly tapered distally and the signum slightly broadened distally.

S. diffluella has in the past been confused with *Scrobipalpa murinella* (Duponchel, 1843). The latter species is very small (male 10–11 mm, female 8–9 mm) and has dark grey-brownish forewings with only few light scales — and no yellowish scales as in *diffluella*.

Bionomics. *S. diffluella* is a taxon of high mountain areas in Central Europe. In Scandinavia it is found — on account of the northern latitude — at lower elevations. According to Klimesch (1951), the larvae are similar to those of *psilella*; they cause blotch-like leaf-mines. In the Alps *Erigeron* sp., *Homogyne alpina*, *Aster alpinus* and *Bellidiastrum michelii* (= *Aster bellidiastrum*) are recorded as host plants (Klimesch, 1958; Povolný, 1964). A leaf-mine of the last-mentioned plant was figured by Klimesch (1958). In Scandinavia the host plant is *Erigeron politus*. Hering (1957) records this species both under *Gnorimoschema diffluella bellidiastri* from *Aster bellidiastrum* and as *Gnorimoschema uniflorellum* Klimesch (a nomen nudum) from *Erigeron alpinus*, *E. uniflorus*, and *Homogyne*.

Klimesch (1943) described the biology and larva of *cacuminum* in great detail. However, his description refers to *Scrobipalpa murinella*.

Distribution. Switzerland, Austria, Germany, Norway, Sweden, Finland, Latvia.

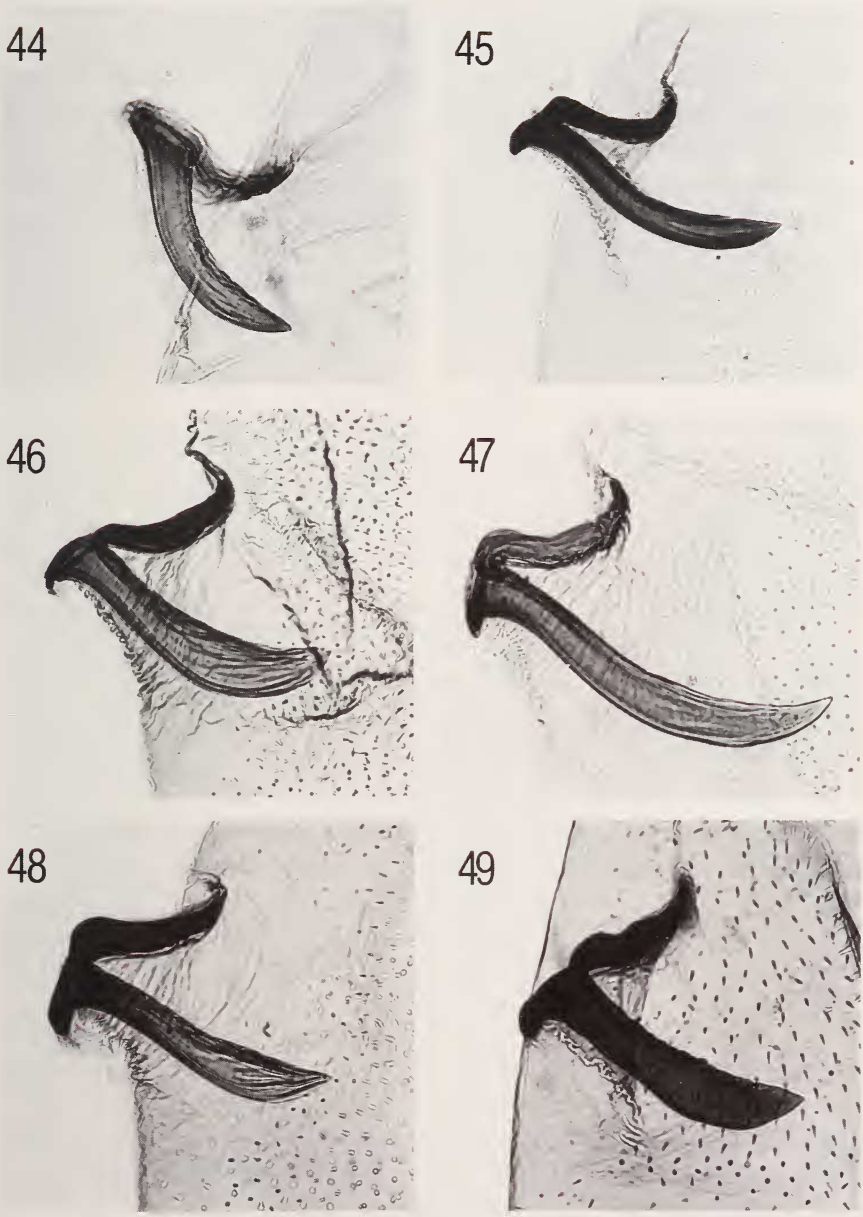
Scrobipalpula tussilaginis (Stainton, 1867)

Gelechia tussilaginis Stainton, 1867: 14.
Lita tussilaginella Heinemann, 1870: 251.
Xystophora retusella Rebel, 1891: 632 **syn. n.**

Material examined. *Switzerland*: Lectotype *Gelechia tussilaginis* ♂, "LECTOTYPE" "G. tussilaginis Frey. Zürich" "Frey Coll. Brit.Mus. 1890–62." "Lectotype. ♂ Gelechia tussilaginis Frey teste K. Sattler. 1977" (BMNH). *Turkey*: Holotype *Xystophora retusella* ♂, "Holo-type" "Mann 1863 Brussa" "Retusella ♂ Type Rbl. 1891" "Mus.Vind. 15.306 ♂" (NMV). *Great Britain* (*England*): 9 ♂, 11 ♀, Dorset, Lyme Regis, sea level, la. 17.vii.1988 (*Tussilago farfara*), leg. Karsholt (TLMF; ZMUC). *Netherlands*: ♀, Brunsummer Heide, 10.viii.1988, leg. Schreurs (Wf 6163 ♀) (coll. van der Wolf, Nuenen); ♂, St. Pietersberg, 24.iv.1991, leg. v. Aartsen (JH 1404) (coll. Huisman, Wezep). *Germany*: ♂, München, 1869, leg. Hartmann (TLMF); ♂, Thüringen (ZMUC); ♂, Krs. Bitterfeld, NSG Möster Birken, 24.v.1995, leg. Sutter (coll. Sutter, Bitterfeld). *Austria*: 4 ♂, 3 ♀, Nordtirol, Innsbruck, 3–15.v.1941 (*Tussilago*), leg. Burmann; ♂, Innsrbuck, Mühlauerklamm, 18.vi.1941, leg. Burmann; ♂, ditto, but 30.v.1942; ♀, ditto, but 3.vi.1969 (all coll. Burmann, Innsbruck); ♀, Nordtirol, Innsbruck, Allerheiligenhöfe, 4.vi.1967, leg. Hernegger; 4 ♂, 2 ♀, Nordtirol, Riβtal, Johannesbachmündung, 950 m, 16.vi.1993, leg. Huemer; ♂, ♀, ditto, but 22.vi.1993, leg. Cerny; ♂, ditto, but 8.vi.1993; ♀, Nordtirol, Riβtal, Weitgriesalm, 900 m, 8.vi.1993, leg. Cerny; ♀, Niederösterreich, Klosterneuburg, Kritzendorfer Au, 12.v.1912, leg. Preissecker (all TLMF). *Poland*: ♂, Pommern, Stettin (slide HH 1652 ♂) (ZMUC). *Italy*: ♀, Südtirol, Naturns, 10.vi.1939, leg. Burmann (coll. Burmann, Innsbruck); ♀, Abruzzo, Dint. Vacri, Chierti, 300 m, 7.v.1953, leg. Parenti (slide OK 2843 ♀) (ZMUC). *Greece*: ♂, Thessaloniki, 12 km NW Guemenissa, 1100 m, 26.vii.1986, leg. Fibiger (ZMUC).

Adult (figs. 11–12) differs from other European *Scrobipalpula* in being slightly larger (wingspan 12–14 mm), and in having the frons creamy yellow. The forewings are slightly broader and more uniform greyish, without contrast between a lighter and a darker part. The two stigmata at 1/3 and 2/3 in middle of wing are large and prominent. Light and yellow brownish scales of forewing are more sparse than in the other species dealt with here. Female similar to male.

Male genitalia (figs. 25–28, 35–37). Genital armature relatively short. Uncus broadly rounded; gnathos hook broadly spatulate, medially constricted to about 0.4–0.7 times width of distal spatula. Valva rather



Figs 44–49. *Scrobipalpula* spp., female genitalia (signa enlarged): 44 — *S. psilella*, Denmark, GEL 628 ♀; 45 — ditto, Italy, Südtirol, GEL 618 ♀; 46 — *S. diffluella*, Austria, Tirol, GEL 619 ♀; 47 — *S. ramosella* (Müller-Rutz), Switzerland, Graubünden, GEL 627 ♀; 48 — *S. tussilaginis*, Austria, Tirol, GEL 617 ♀; 49 — ditto, England, GEL 623 ♀ [reversed image].

long, at most level with uncus, distally moderately dilated, apex rounded; sacculus very short, digitate. Posterior margin of vinculum with prominent paired process, separated by deep U-shaped incision, apex with outwardly curved tip. Saccus broad, subtriangular. Aedeagus slender with subterminal hooklet.

Female genitalia (figs. 42–43, 48–49). Segment VIII ventromedially with distinct honeycomb sculpture, medially separated by membraneous and weakly sculptured zone. Antrum short, distally abruptly tapered, funnel-shaped. Ductus bursae with relatively broad colliculum. Corpus bursae long, pear-shaped, distinct minute spining, with distinct, distally slightly dilated, hook-like signum.

Remarks. This species was first mentioned as a larval record, suspected of belonging to *Gelechia* (Frey, 1857). Later it was named *Gelechia tussilaginis* without description of the imago but clearly referring to this taxon (Frey, 1867). However, the specific name was already validated by Stainton (1867), whose description was mentioned by Frey (1870b). A further name, occasionally used by Heinemann (1870), was *Lita tussilaginella*.

Xystophora retusella was described from a single male collected by Mann in Turkey (Rebel, 1891). The holotype has been examined by us and is regarded as a junior synonym of *Scrobipalpula tussilaginis*, with which it completely agrees in external and genitalic characters.

The male genitalia differ from *psilella* by the distally abruptly dilated valva without pointed apex and the narrower, sub-triangular saccus. They are furthermore distinguished from *diffluella* by the shape of the saccus and from *ramosella* by the gnathos hook. Female genitalia are best separated from *psilella* by the distinctly shorter and distally abruptly tapered antrum. The differences in the female genitalia from other species of the complex are weak and mainly to be found in the shape of the antrum and signum.

In collections, *S. tussilaginis* is often confused with small specimens of *Scrobipalpa obsoletella* (Fischer v. Röslerstamm, 1841), and they are indeed similar. *S. tussilaginis* is best recognized by the cream yellowish frons. Moreover it has the yellow-brownish scales on the forewing gathered around the stigmata and along veins, whereas in *obsoletella* they are scattered all over the wing.

Bionomics. Host plant: *Tussilago farfara*, according to Hering (1957) and Klimesch (1958) also on *Petasites*. The larval habits and its external characters have been described in detail by Pelham-Clinton (1989).

According to his paper, the last instar larvae are bright apple-green with matt dorsal surface and ochreous brown head and prothoracic plate, the latter divided medially. They produce large blotch mines in a leaf and pupate outside on the underside of a leaf or among leaf-litter. The leaf mine is figured by Klimesch (1958). The species is bivoltine in Great Britain, where it occurs at sea level, but it is stated to be univoltine on the continent (Hering, 1957). This observation seems to be correct at least for some montane areas visited by P. Huemer.

Distribution. England, France, Netherlands, Germany, Switzerland, Austria, Poland, Italy, Hungary, Greece, Turkey.

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